

WHAT IS CLAIMED IS:

1. An optical pickup device comprising:

a dual wavelength light source module for emitting a  
5 selected one of two light beams having different wavelengths;

a wavelength selective dual grating having a  
predetermined thickness while being formed at an upper surface  
thereof with a plurality of upper diffraction grating patterns  
adapted to split said selected light beam, received from said  
10 dual wavelength light source, into at least three beams of  
zero, +1st, and -1st orders, when said selected light beam is  
one of said two light beams, and at a lower surface thereof  
with a plurality of lower diffraction grating patterns adapted  
to split said selected light beam into at least three beams of  
15 zero, +1st, and -1st orders, when said selected light beam is  
the other light beam;

a beam splitter for receiving said selected light beam  
emerging from said dual grating, and reflecting said selected  
light beam toward an optical disc;

20 an objective lens for receiving said selected light beam  
from said beam splitter, and focusing said selected light beam  
onto a spot on an optical disc;

a hologram for receiving said three beams of said  
selected light beam reflected from said optical disc after  
25 striking a signal track of said optical disc, said hologram

maximizing a diffraction efficiency of the zero-order one of  
said three beams, included in said selected light beam,  
traveling in a straight direction, when said selected light  
beam is said one light beam, while maximizing a diffraction  
5 efficiency of the +1st or -1st-order one of said three beams,  
included in said selected light beam, traveling in a refracted  
direction, when said selected light beam is said other light  
beam, said hologram being adjustable in position to focus said  
zero-order beam and said +1st or -1st-order beam on the same  
10 spot; and

a photodetector for detecting said three beams of said  
selected light beam emerging from said hologram, and generating  
electrical signals, based on said detected beams, respectively.

15 2. The optical pickup device according to claim 1,  
wherein said upper diffraction grating patterns and said lower  
diffraction grating patterns have different tilt angles,  
respectively.

20 3. The optical pickup device according to claim 2,  
wherein respective tilt angles of said upper and lower  
diffraction grating patterns are defined by the following  
expression:

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$$\Theta = \text{ASIN}\left(\frac{TP/2}{D}\right)$$

where,  $\Theta$  represents a tilt angle of diffraction grating patterns, TP represents a track pitch of an optical disc, and D represents a distance between main and sub ones of three split beams focused on the optical disc.

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4. The optical pickup device according to claim 1, wherein said predetermined thickness of said dual grating is a thickness at which a distance between main and sub ones of said three beams, included in said one light beam, focused on said photodetector is identical to that of said other light beam.

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5. The optical pickup device according to claim 1, wherein said hologram has a multi-step phase grating structure so that it maximizes respective diffraction efficiencies of said zero-order beam and said +1 or -1st-order beam.

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6. The optical pickup device according to claim 1, wherein said hologram is installed to be movable along an optical axis while being rotatable about said optical axis.

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7. The optical pickup device according to claim 1, wherein said one light beam is a light beam having a wavelength of 650nm for DVDs, and said other light beam is a light beam having a wavelength of 780nm for CDs.

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8. The optical pickup device according to claim 7,  
wherein said lower diffraction grating patterns of said dual  
grating are adapted to split said light beam for CDs, and said  
upper diffraction grating patterns of said dual grating are  
5 adapted to split said light beam for DVDs.

9. The optical pickup device according to claim 7,  
wherein said hologram is adapted to maximize a diffraction  
efficiency of a zero-order one of said light beam for DVDs,  
10 while maximizing a diffraction efficiency of a +1st-order one  
of said light beam for CDs.

10. The optical pickup device according to claim 1,  
further comprising:

15 a mirror arranged between said beam splitter and said  
optical disc, and adapted to reflect said selected light beam  
reflected from said beam splitter toward said optical disc.

11. The optical pickup device according to claim 10,  
20 further comprising:

a front photodiode arranged in rear of said mirror, and  
adapted to adjust an optical power of said selected light beam.

12. The optical pickup device according to claim 1,  
25 further comprising:

a collimator lens arranged between said beam splitter and said objective lens, and adapted to convert a divergent light beam into a parallel beam.

5           13. The optical pickup device according to claim 1, further comprising:

a sensor lens arranged between said hologram and said photodetector, and adapted to focus said beams emerging from said hologram onto associated cells of said photodetector, respectively.

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14. An optical pickup device comprising:

a dual wavelength light source module for emitting a selected one of two light beams having different wavelengths;

15           a wavelength selective dual grating having a predetermined thickness while being formed at an upper surface thereof with a plurality of upper diffraction grating patterns adapted to split said selected light beam, received from said dual wavelength light source, into at least three beams of zero, +1st, and -1st orders, when said selected light beam is one of said two light beams, and at a lower surface thereof with a plurality of lower diffraction grating patterns adapted to split said selected light beam into at least three beams of zero, +1st, and -1st orders, when said selected light beam is

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25           the other light beam;

a beam splitter for receiving said selected light beam emerging from said dual grating, and reflecting said selected light beam toward an optical disc;

5 a mirror arranged between said beam splitter and said optical disc, and adapted to reflect said selected light beam reflected from said beam splitter toward said optical disc;

a front photodiode arranged in rear of said mirror, and adapted to adjust an optical power of said selected light beam;

10 a collimator lens arranged between said beam splitter and said objective lens, and adapted to convert a divergent light beam into a parallel light beam;

an objective lens for focusing, onto a spot on an optical disc, said selected light beam traveling toward said optical disc;

15 a hologram for receiving said three beams of said selected light beam reflected from said optical disc after striking a signal track of said optical disc, said hologram maximizing a diffraction efficiency of the zero-order one of said three beams, included in said selected light beam, traveling in a straight direction, when said selected light beam is said one light beam, while maximizing a diffraction efficiency of the +1st or -1st-order one of said three beams, included in said selected light beam, traveling in a refracted direction, when said selected light beam is said other light beam, said hologram being adjustable in position to focus said  
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zero-order beam and said +1st or -1st-order beam on the same spot;

a photodetector for detecting said three beams of said selected light beam emerging from said hologram, and generating electrical signals, based on said detected beams, respectively; and

a sensor lens arranged between said hologram and said photodetector, and adapted to focus said beams emerging from said hologram onto associated cells of said photodetector, respectively.

15. The optical pickup device according to claim 14, wherein said upper diffraction grating patterns and said lower diffraction grating patterns have different tilt angles, respectively.

16. The optical pickup device according to claim 14, wherein said predetermined thickness of said dual grating is a thickness at which a distance between main and sub ones of said three beams, included in said one light beam, focused on said photodetector is identical to that of said other light beam.

17. The optical pickup device according to claim 14, wherein said hologram has a multi-step phase grating structure so that it maximizes respective diffraction efficiencies of

said zero-order beam and said +1 or -1st-order beam.

18. The optical pickup device according to claim 14,  
wherein said hologram is installed to be movable along an  
5 optical axis while being rotatable about said optical axis.

19. The optical pickup device according to claim 14,  
wherein said one light beam is a light beam having a wavelength  
of 650nm for DVDs, and said other light beam is a light beam  
10 having a wavelength of 780nm for CDs.

20. The optical pickup device according to claim 19,  
wherein said lower diffraction grating patterns of said dual  
grating are adapted to split said light beam for CDs, and said  
15 upper diffraction grating patterns of said dual grating are  
adapted to split said light beam for DVDs.

21. The optical pickup device according to claim 19,  
wherein said hologram is adapted to maximize a diffraction  
20 efficiency of a zero-order one of said light beam for DVDs,  
while maximizing a diffraction efficiency of a +1st-order one  
of said light beam for CDs.